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CHRISTIE, PARKER & HALE, LLP
PO BOX 7068
PASADENA, CA 91109-7068

EXAMINER	
BROWN JR, NATHAN H	
ART UNIT	PAPER NUMBER
2121	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/524,606	LI, JINYAN	
	Examiner	Art Unit	
	Nathan H. Brown, Jr.	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE (3) MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-75* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Examiner's Detailed Office Action

1. This Office is responsive to application 10/524,606, filed February 14, 2005.

2. Claims 1-75 have been examined.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-66 and 68-75 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: mathematical abstraction, algorithm, and/or software per se.

Claims 1-46, 68-72 and 74 recite a "method of determining whether a test sample, having test data T, is categorized in one of a number n of classes". Thus, claims 1-46, 68-72 and 74 recite a process that includes the §101 judicial exception of mathematical abstraction. Since claims 1-46, 68-72 and 74 simply deduce "which of said n classes of data the test data is categorized in", no physical transformation is involved. As no physical transformation is involved, for the claims to be statutory, they must provide a useful, concrete, and tangible result. While "deducing which of

said n classes of data the test data is categorized in" maybe considered to be concrete and useful, its tangibility is questionable. The tangible requirement requires that the claim must recite more than a §101 judicial exception, and in that process set forth a practical application of that §101 judicial exception to produce a real-world result. Examiner notes that "deducing which of said n classes of data the test data is categorized in" does not produce a real-world result as "classes of data", the categorization of the data, and the data it self are abstractions (at best, *representative* of entities and relationships in the real-world). Thus, claims 1-46, 68-72 and 74 recite no more than a §101 judicial exception of mathematical abstraction and are thus non-statutory under 35 U.S.C. 101. Additionally, claim 70 is considered to be software per se, which is not patent eligible subject matter.

Claims 47-56 and 75 recite a "computer program product for determining whether a test sample, for which there exists test data, is categorized in one of a number of classes". Claims 47-56 and 75 are clearly a computer related manufacture. Claims 47-56 and 75 recite a list structure, which meets the IEEE definition of a data structure. Claims 47-56 and 75 recite a "a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising: ...". Thus claims 47-56 and 75 disclose a non-functional listing of computer program components (i.e., software per se) recorded onto a computer readable storage medium. Now, nonfunctional descriptive material recorded on some computer-readable medium, in a computer or on an electromagnetic carrier signal, is not statutory since no requisite functionality is present to satisfy the practical application requirement. Thus claims 47-56 and 75 are non-statutory under 35 U.S.C. 101.

Claims 57-66 and 73 recite a "system for determining whether a test sample, for which there exists test data, is categorized in one of a number of classes". Such a system is clearly a computer related manufacture. Claims 57-66 and 73 recite "at least one. memory, at least one processor and at least one user interface, all of which are connected to one another by at least one bus, wherein said at least one processor is configured to: ... create a first list and a second list ..." to ultimately "deduce whether the test sample is categorized in the first class of data or in the second class of data". This meets the test for functionality. Now, as there is no physical transformation associated with the operation of the system, it must provide a useful, concrete, and tangible result. While deducing "whether the test sample is categorized in the first class of data or in the second class of data" maybe considered to be concrete and useful, its tangibility is questionable. The tangible requirement requires that the claim must recite more than a §101 judicial exception, and in that process set forth a practical application of that §101 judicial exception to produce a real-world result. Examiner notes that "deducing which of said n classes of data the test data is categorized in" does not produce a real-world result as "classes of data", the categorization of the data, and the data it self are abstractions (at best, *representative* of entities and relationships in the real-world). Thus, claims 57-66 and 73 ultimately recite no more than a §101 judicial exception of mathematical abstraction and/or algorithm and are thus non-statutory under 35 U.S.C. 101.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 11, and 67 are rejected under 35 U.S.C. 102(b) as being anticipated by *Wang et al.*, "Monitoring gene expression profile changes in ovarian carcinomas using cDNA microarray", 1999.

Regarding claims 1 and 11 (where n = 2). (Original) A method of determining whether a test sample, having test data T, is categorized in one of a number n of classes wherein n is 2 or more (see p. 104, "...two criteria were used to classify candidate cDNAs as differentially expressed between normal and neoplastic ovary.", *Examiner inteprets "normal and neoplastic ovary" as two classes.*), comprising:

extracting a plurality of emerging patterns from a training data set D that has at least one instance of each of said n classes of data (*see* p. 104, §3.2, col. 1, "To investigate and monitor the gene expression profile changes in ovarian cancers, replicates of the fabricated cDNA arrays were hybridized independently with cDNA probes that were generated from seven different ovarian tumor specimens, including two papillary serous ovarian tumors, two endometroid ovarian cancers, one poorly differentiated

ovarian tumor, one mucinous and one clear cell ovarian tumor.", *Examiner interprets the "seven different ovarian tumor specimens" to comprises training data.*);

creating n lists (*see* p. 104, col. 2, "After analyzing ...", Examiner interprets n = 2 and the first list to be the "295 cDNAs" exhibiting "greater than 3-fold overexpression in tumor probe relative to normal probe" and the second list to be the "431 cDNAs" exhibiting "greater than 3-fold overexpression in normal probe relative to tumor probe".), wherein:

an ith list of said n lists contains a frequency of occurrence, $f_i(m)$, of each emerging pattern $EP_i(m)$ from said plurality of emerging patterns that has a non-zero occurrence in an ith class of data (see above, *Examiner interprets* $f_1(1) = 295$ *and* $f_2(2) = 431$.);

using a fixed number, k, of emerging patterns, wherein k is substantially less than a total number of emerging patterns in the plurality of emerging patterns, calculating n scores (*see* p. 103, §3.1, col. 1, *Examiner interprets the "selected ESTs and clones from several ovarian cDNA libraries", making up the microarray, to contain the emerging patterns (i.e., genes). Examiner interprets k to be the 96 "randomly picked cDNA clones" which is much less than the 5766 members of the microarray.*);

wherein:

an ith score of said n scores is derived from the frequencies of k emerging patterns in said ith list that also occur in said test data (*see* p. 104, Figs. 1(A) and 1(B) and p. 104, Examiner interprets each scatter gram to comprise an ith score of said n scores is derived from the frequencies of k emerging patterns in said ith list that also occur in said test data.); and

deducing which of said n classes of data the test data is categorized in, by selecting the

highest of said n scores (*see* p. 104, Figs. 1(A) and 1(B) and p. 104, col. 1, "Hybridization results of the microarray with Cy3-labeled cDNA probe from normal ovary and Cy5-labeled cDNA probe from ovarian tumor demonstrate that, on average, approx. 30% of the cDNAs exhibit more than a 2-fold expression level change and about 9% of the cDNAs had a difference in expression of greater than 3-fold. Scatter plots with tumor probes revealed a very wide distribution pattern (Fig. 1B).").

Regarding claim 67. (Original) *Wang et al.* teach a method of determining whether a sample cell is cancerous (*see* p. 104, §3.2, col. 2, "...two criteria were used to classify candidate cDNAs as differentially expressed between normal and neoplastic ovary. The cDNA clones exhibited a 3-fold or greater change in expression level in more than one ovarian tumor probe, and the signal intensity exceeded the background.", *Examiner interprets "neoplastic" to be an adjective, meaning of or pertaining to or constituting a neoplasm or neoplasia, which is indicative of cancer.*),

comprising:

extracting a plurality of emerging patterns from a data set that comprises gene expression data for a plurality of cancerous cells and a gene expression data for a plurality of normal cells (*see* p. 104, §3.2, col. 1, "To investigate and monitor the gene expression profile changes in ovarian cancers, replicates of the fabricated cDNA arrays were hybridized independently with cDNA probes that were generated from seven different ovarian tumor specimens, including two papillary serous ovarian tumors, two endometroid ovarian cancers, one poorly differentiated ovarian tumor, one

mucinous and one clear cell ovarian tumor.", *Examiner interprets the "seven different ovarian tumor specimens" to comprises gene expression data for a plurality of cancerous cells and a gene expression data for a plurality of normal cells.*);

creating a first list and a second list (*see* p. 104, col. 2, "After analyzing ...", Examiner interprets the first list to be the "295 cDNAs" exhibiting "greater than 3-fold overexpression in tumor probe relative to normal probe" and the second list to be the "431 cDNAs" exhibiting "greater than 3-fold overexpression in normal probe relative to tumor probe".) wherein:

said first list contains a frequency of occurrence, $f_i^{(1)}$, of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said cancerous cells (*see* above, Examiner interprets the "295 cDNAs" exhibiting "greater than 3-fold overexpression in tumor probe relative to normal probe" to be a frequency of occurrence in the first list.) and

said second list contains a frequency of occurrence, $f_i^{(2)}$, of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said normal cells (*see* above, *Examiner interprets the "431 cDNAs" exhibiting "greater than 3-fold overexpression in normal probe relative to tumor probe" to be a frequency of occurrence in the second list.*);

using a fixed number, k, of emerging patterns, wherein k is substantially less than a total number of emerging patterns in the plurality of emerging patterns (*see* p. 103, §3.1, col. 1, *Examiner interprets the "selected ESTs and clones from several ovarian cDNA libraries", making up the microarray, to contain the emerging patterns (i.e., genes). Examiner interprets k to be the 96 "randomly picked cDNA clones" which is much less than the 5766 members of the microarray.*), calculating:

a first score derived from the frequencies of *k* emerging patterns in said first list that also occur in said test data (*see* p. 104, Fig. 1(A) and p. 103, §3.1, col. 2, *Examiner interprets the score to be the Cy5 to Cy3 signal ratio. Examiner interprets a first score to be "Ovarian cancer (Cy5) / Normal Ovary (Cy3)".*), and

a second score derived from the frequencies of *k* emerging patterns in said second list that also occur in said test data (*see* p. 104, Fig. 1(B) and p. 104, col. 1, *Examiner interprets the score to be the Cy5 to Cy3 signal ratio. Examiner interprets a first score to be "Normal Liver (Cy5) / Normal Liver (Cy3)".*); and

deducing whether the sample cell is cancerous if said first score is higher than said second score (*see* p. 104, Figs. 1(A) and 1(B) and p. 104, col. 1, "Hybridization results of the microarray with Cy3-labeled cDNA probe from normal ovary and Cy5-labeled cDNA probe from ovarian tumor demonstrate that, on average, approx. 30% of the cDNAs exhibit more than a 2-fold expression level change and about 9% of the cDNAs had a difference in expression of greater than 3-fold. Scatter plots with tumor probes revealed a very wide distribution pattern (Fig. 1B).").

7. Claims 71 and 73 are rejected under 35 U.S.C. 102(b) as being anticipated by *Gerakis et al.*, "A Computer Program for Soil Textural Classification", 1999.

Regarding claim 71. (Original) *Gerakis et al.* teach a computer program product for determining whether a test sample, for which there exists test data, is categorized in one of a number of classes, constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings (*see* Abstract and pp. 807-808, §Program Description and Operation, *Examiner interprets Applicants' Specification FIG. 6 perform substantially the same multiclass classification as Gerakis et al.'s Fig. 1. (see p. 808).*).

Regarding claim 73. (Original) *Gerakis et al.* teach a system for determining whether a test sample, for which there exists test data, is categorized in one of a number of classes, constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings (*see* Abstract, *Examiner interprets World Wide Web and 133 MHz Pentium microcomputer to be systems.*).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 47 and 57 are rejected under 35 U.S.C. 103(a) as being as being unpatentable over *Ramaswamy et al.*, "Multiclass cancer diagnosis using tumor gene expression signatures", 2001 in view of *Sheppard* (USPN 6,026,397) and further in view of *Wang et al.*

Regarding claim 47. (Original) *Ramaswamy et al.* teach a computer program product for determining whether a test sample, for which there exists test data, is categorized in a first class or a second class, wherein the computer program product is for use in conjunction with a computer system (*see* p. 15150, col. 1, "The SVM experiments described in this article were performed by using an implementation of SVM-FU", *Examiner interprets "an implementation of SVM-FU" to be a computer program product.*), the computer program product comprising:

at least one statistical analysis tool (*see* p. 15150, para. Statistical Analysis, "A class-proportional random predictor was used to determine the number of correct classifications that would be expected by chance for multiclass prediction.", *Examiner interprets a "class-proportional random predictor" to be a statistical tool.*);

at least one sorting tool (*see* p. 15150, para. Recursive Feature Elimination. "This feature selection method recursively removes features based on the absolute magnitude of each hyperplane element (13).", *Examiner interprets recursively removing features to be sorting (the features).*);

Ramaswamy et al. do not teach a computer readable storage medium and a computer program mechanism embedded therein and control instructions for: accessing a data set that has at least one instance of a first class of data and at least one instance of a second class of data. *Sheppard*

does teach a computer readable storage medium (*see* col. 4, lines 24-59 and Fig. 1, items 22 and 24) and a computer program mechanism embedded therein (*see* Fig. 1, items 34, 36, and 38, *Examiner interprets items 34, 36, and 38 to be computer program mechanisms embedded in a computer readable storage medium for loading into data processor 32.*) and control instructions for accessing a data set that has at least one instance of a first class of data and at least one instance of a second class of data (*see* col. 8, lines 1-13, *Examiner interprets the "rule based segmentation function" to comprise control instructions for: accessing a data set that has at least one instance of a first class of data and at least one instance of a second class of data. Examiner interprets the "different segments" to be at least one instance of a first class of data and at least one instance of a second class of data.*).

Neither *Ramaswamy et al. or Sheppard* teach extracting a plurality of emerging patterns from said data set;

creating a first list and a second list wherein, for each of said plurality of emerging patterns:

said first list contains a frequency of occurrence, $f_i^{(1)}$, of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said first class of data, and

said second list contains a frequency of occurrence, $f_i^{(2)}$ of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said second class of data ;

using a fixed number, k, of emerging patterns, wherein k is substantially

less than a total number of emerging patterns in the plurality of emerging patterns, calculating:

a first score derived from the frequencies of k emerging patterns in said first list that also occur in said test data, and

a second score derived from the frequencies of k emerging patterns in said second list that also occur in said test data; and

deducing whether the test sample is categorized in the first class of data or in the second class of data by selecting the higher of the first score and the second score.

However, Wang et al. do teach extracting a plurality of emerging patterns from said data set (*see* p. 104, §3.2, col. 1, "To investigate and monitor the gene expression profile changes in ovarian cancers, replicates of the fabricated cDNA arrays were hybridized independently with cDNA probes that were generated from seven different ovarian tumor specimens, including two papillary serous ovarian tumors, two endometroid ovarian cancers, one poorly differentiated ovarian tumor, one mucinous and one clear cell ovarian tumor.", *Examiner interprets the "seven different ovarian tumor specimens" to comprises gene expression data for a plurality of cancerous cells and a gene expression data for a plurality of normal cells.*);

creating a first list and a second list wherein (*see* p. 104, col. 2, "After analyzing ...", Examiner interprets the first list to be the "295 cDNAs" exhibiting "greater than 3-fold overexpression in tumor probe relative to normal probe" and the second list to be the "431

cDNAs" exhibiting "greater than 3-fold overexpression in normal probe relative to tumor probe".), for each of said plurality of

emerging patterns:

said first list contains a frequency of occurrence, $f_i^{(1)}$, of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said

first class of data (*see* above, Examiner interprets the "295 cDNAs" exhibiting "greater than 3-fold overexpression in tumor probe relative to normal probe" to be a frequency of occurrence in the first list.), and

said second list contains a frequency of occurrence, $f_i^{(2)}$of each

emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said second class of data (*see* above, *Examiner interprets the "431 cDNAs" exhibiting "greater than 3-fold overexpression in normal probe relative to tumor probe" to be a frequency of occurrence in the second list.*);

using a fixed number, k, of emerging patterns, wherein k is substantially less than a total number of emerging patterns in the plurality of emerging patterns (*see* p. 103, §3.1, col. 1, *Examiner interprets the "selected ESTs and clones from several ovarian cDNA libraries", making up the microarray, to contain the emerging patterns (i.e., genes). Examiner interprets k to be the 96 "randomly picked cDNA clones" which is much less than the 5766 members of the microarray.*), calculating:

a first score derived from the frequencies of k emerging patterns in

said first list that also occur in said test data (*see* p. 104, Fig. 1(A) and p. 103, §3.1, col. 2, *Examiner interprets the score to be the Cy5 to Cy3 signal ratio. Examiner interprets a first score to be "Ovarian cancer (Cy5) / Normal Ovary (Cy3)".*), and

a second score derived from the frequencies of k emerging patterns in said second list that also occur in said test data (*see* p. 104, Fig. 1(B) and p. 104, col. 1, *Examiner interprets the score to be the Cy5 to Cy3 signal ratio. Examiner interprets a first score to be "Normal Liver (Cy5) / Normal Liver (Cy3)".*); and

deducing whether the test sample is categorized in the first class of data or in the second class of data by selecting the higher of the first score and the second score (*see* p. 104, Figs. 1(A) and 1(B) and p. 104, col. 1, "Hybridization results of the microarray with Cy3-labeled cDNA probe from normal ovary and Cy5-labeled cDNA probe from ovarian tumor demonstrate that, on average, approx. 30% of the cDNAs exhibit more than a 2-fold expression level change and about 9% of the cDNAs had a difference in expression of greater than 3-fold. Scatter plots with tumor probes revealed a very wide distribution pattern (Fig. 1B).).

Regarding claim 57. (Original) *Ramaswamy et al.* teach a system for determining whether a test sample, for which there exists test data, is categorized in a first class or a second class (*see* col. 8, lines 1-13, *Examiner interprets the "rule based segmentation function" to comprise control instructions for: accessing a data set that has at least one instance of a first class of data and at least one instance of a second class of data. Examiner interprets the "different segments" to be at least one instance of a first class of data and at least one instance of a second class of data.*).

Ramaswamy et al. do not teach at least one memory, at least one processor and at least one user interface, all of which are connected to one another by at least one bus, wherein said at least one processor is configured to access a data set that has at least one instance of a first class of data and at least one instance of a second class of data. *Sheppard* does teach at least one memory (*see* col. 4, lines 24-59 and Fig. 1, item 14), at least one processor (*see* col. 4, lines 24-59 and Fig. 1, item 12) and at least one user interface (*see* col. 4, lines 24-59 and Fig. 1, items 20 and 28), all of which are connected to one another by at least one bus (*see* Fig. 1, *Examiner interprets bi-direction connection between processor and RAM and ROM to be at least one bus.*), wherein said at least one processor is configured to access a data set that has at least one instance of a first class of data and at least one instance of a second class of data (*see* col. 8, lines 1-13, *Examiner interprets the "rule based segmentation function" to comprise control instructions for: accessing a data set that has at least one instance of a first class of data and at least one instance of a second class of data. Examiner interprets the "different segments" to be at least one instance of a first class of data and at least one instance of a second class of data.*);

Neither *Ramaswamy et al. or Sheppard* teach extracting a plurality of emerging patterns from said data set;

creating a first list and a second list wherein, for each of said plurality of emerging patterns:

said first list contains a frequency of occurrence, $f_i^{(1)}$, of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said first class of data, and

said second list contains a frequency of occurrence, $f_i^{(2)}$ of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said second class of data ;

using a fixed number, k, of emerging patterns, wherein k is substantially less than a total number of emerging patterns in the plurality of emerging patterns, calculating:

a first score derived from the frequencies of k emerging patterns in said first list that also occur in said test data, and

a second score derived from the frequencies of k emerging patterns in said second list that also occur in said test data; and

deducing whether the test sample is categorized in the first class of data or in the second class of data by selecting the higher of the first score and the second score.

However, Wang et al. do teach extracting a plurality of emerging patterns from said data set (*see* p. 104, §3.2, col. 1, "To investigate and monitor the gene expression profile changes in ovarian cancers, replicates of the fabricated cDNA arrays were hybridized independently with cDNA probes that were generated from seven different ovarian tumor specimens, including two papillary serous ovarian tumors, two endometroid ovarian cancers, one poorly differentiated ovarian tumor, one mucinous and one clear cell ovarian tumor.", *Examiner interprets the "seven different ovarian tumor specimens" to comprises gene expression data for a plurality of cancerous cells and a gene expression data for a plurality of normal cells.*);

creating a first list and a second list wherein (*see* p. 104, col. 2, "After analyzing ...", Examiner interprets the first list to be the "295 cDNAs" exhibiting "greater than 3-fold overexpression in tumor probe relative to normal probe" and the second list to be the "431 cDNAs" exhibiting "greater than 3-fold overexpression in normal probe relative to tumor probe".), for each of said plurality of

emerging patterns:

said first list contains a frequency of occurrence, $f_i^{(1)}$, of each emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said

first class of data (*see* above, Examiner interprets the "295 cDNAs" exhibiting "greater than 3-fold overexpression in tumor probe relative to normal probe" to be a frequency of occurrence in the first list.), and

said second list contains a frequency of occurrence, $f_i^{(2)}$of each

emerging pattern i from said plurality of emerging patterns that has a non-zero occurrence in said second class of data (*see* above, *Examiner interprets the "431 cDNAs" exhibiting "greater than 3-fold overexpression in normal probe relative to tumor probe" to be a frequency of occurrence in the second list.*);

using a fixed number, k, of emerging patterns, wherein k is substantially less than a total number of emerging patterns in the plurality of emerging patterns (*see* p. 103, §3.1, col. 1, *Examiner interprets the "selected ESTs and clones from several ovarian cDNA libraries", making up the microarray, to contain the emerging patterns (i.e., genes). Examiner interprets k to be the 96 "randomly picked cDNA clones." which is much less than the 5766 members of the microarray.*), calculating:

a first score derived from the frequencies of k emerging patterns in said first list that also occur in said test data (*see* p. 104, Fig. 1(A) and p. 103, §3.1, col. 2, *Examiner interprets the score to be the Cy5 to Cy3 signal ratio. Examiner interprets a first score to be "Ovarian cancer (Cy5) / Normal Ovary (Cy3)".*), and

a second score derived from the frequencies of k emerging patterns in said second list that also occur in said test data (*see* p. 104, Fig. 1(B) and p. 104, col. 1, *Examiner interprets the score to be the Cy5 to Cy3 signal ratio. Examiner interprets a first score to be "Normal Liver (Cy5) / Normal Liver (Cy3)".*); and

deducing whether the test sample is categorized in the first class of data or in the second class of data by selecting the higher of the first score and the second score (*see* p. 104, Figs. 1(A) and 1(B) and p. 104, col. 1, "Hybridization results of the microarray with Cy3-labeled cDNA probe from normal ovary and Cy5-labeled cDNA

probe from ovarian tumor demonstrate that, on average, approx. 30% of the cDNAs exhibit more than a 2-fold expression level change and about 9% of the cDNAs had a difference in expression of greater than 3-fold. Scatter plots with tumor probes revealed a very wide distribution pattern (Fig. 1B).).

It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Ramaswamy et al.* with *Sheppard* to discover discriminatory patterns and associations within large quantities of unexplored information having previously unknown relationships. The uncovered patterns and associations in the data and expected relationships can be verified quickly and easily with the neural clustering function. Further, it would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Ramaswamy et al.* and *Sheppard* with *Wang et. al.* to analyze the results of microarray hybridizations to provide new leads for tumor diagnosis and intervention.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan H. Brown, Jr. whose telephone number is 571-272- 8632. The examiner can normally be reached on M-F 0830-1700. If attempts to reach the examiner by

telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 571-272-3687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anthony Knight
Supervisory Patent Examiner
Tech Center 2100

Nathan H. Brown, Jr.
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